

# Solve problems with two unknowns

## Notes and guidance

Building on previous learning, in this small step children solve problems with two unknowns when more than one piece of information is given, so there is only one possible solution.

Examples include the case where the sum and the difference of both unknowns is given. Bar models are used throughout the step to represent problems and to support children's understanding.

Other structures are also explored, including where one of the unknowns is a multiple of the other. In this case, a bar model can be used to work out the values of the numbers if either their total or their difference is known. Finally, children look at equations with two unknowns where the coefficient of only one of the unknowns is different, for example  $x + 2y = 17$  and  $x + 5y = 38$ . Again, a bar model will help children to see why  $3y$  must be equal to 21, after which  $y$  and  $x$  can be found.

## Things to look out for

- Children may use trial and error rather than a bar model approach.
- Children may think that there are several possible solutions, as in the last step.

## Key questions

- How can you represent this information as a pair of equations?
- How can you represent this information with a bar model?
- What information does the bar model show?  
What else can you work out?
- How can you draw a bar model to represent the problem?  
Which parts can you label straight away?  
What else can you work out?
- Is there more than one possible solution?

## Possible sentence stems

- If \_\_\_\_\_ lots of  $x$  is worth \_\_\_\_\_, then  
 $x = \text{_____} \div \text{_____} = \text{_____}$
- If I know the value of \_\_\_\_\_, I can find the value of \_\_\_\_\_ by substituting into the equation \_\_\_\_\_

## National Curriculum links

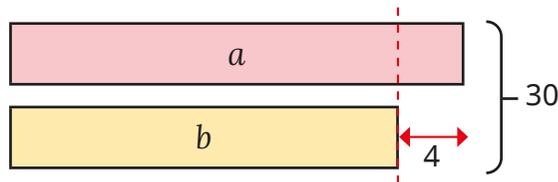
- Express missing number problems algebraically
- Find pairs of numbers that satisfy an equation with two unknowns

# Solve problems with two unknowns

## Key learning

- The sum of  $a$  and  $b$  is 30

The difference between  $a$  and  $b$  is 4



Use the bar model to work out the values of  $a$  and  $b$ .

- Here is some information about two numbers,  $x$  and  $y$ .

$$x + y = 10$$

$$x - y = 2$$

- Label the information on the bar model.



- Use the bar model to work out the values of  $x$  and  $y$ .

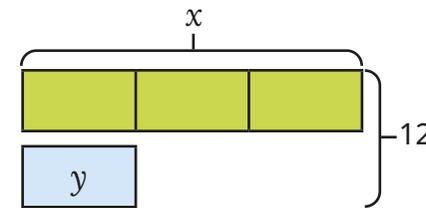
- The sum of two numbers,  $p$  and  $q$ , is 55

The difference between  $p$  and  $q$  is 7

Show this as a bar model and find the values of  $p$  and  $q$ .

- The sum of  $x$  and  $y$  is 12

$x$  is 3 times the size of  $y$ .



- Explain how you can use the bar model to work out the value of  $y$ .

- What is the value of  $x$ ?

Are there any other possible solutions?

- The sum of two numbers,  $a$  and  $b$ , is 18

$a$  is one-fifth the size of  $b$ .

Draw a bar model to represent this problem and work out the values of  $a$  and  $b$ .

- Tom and Ann both go for a walk.

Between them they walk 21 km.

Tom walks 6 times as far as Ann does.

How much further does Tom walk than Ann?

# Solve problems with two unknowns

## Reasoning and problem solving

The sum of  $x$  and  $y$  is 40  
 $x$  is 4 times the size of  $y$ .  
 What is the value of  $y$ ?

$y = 10$ , because  
 40 divided by 4 is  
 equal to 10

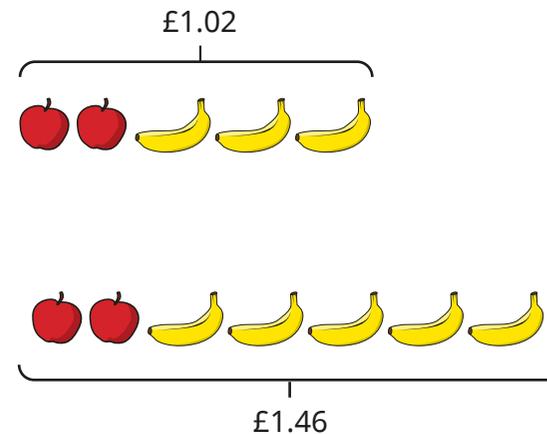


Show that Tiny is wrong.  
 Find the correct values of  $x$  and  $y$ .

If  $y = 10$ ,  $x = 40$  and  
 $x + y = 50$

$y = 8$  and  $x = 32$

Two apples and three bananas  
 cost £1.02  
 Two apples and five bananas  
 cost £1.46



What is the total cost of one apple  
 and one banana?

40p